DRAFT FINAL
INTERIM REMEDIAL ACTION PLAN
Drum Burial Area
Former Pacific Powder Site
Maytown, Washington

Prepared for: Citifor, Inc.

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1 Introduction

This Interim Remedial Action Plan (IRAP) describes remedial actions that will be performed at the Drum Burial Area located on the former Pacific Powder Site in Maytown, Washington (Figure 1). Elevated concentrations of dinitrotoluene (DNT) are currently present in site soils within two areas. The objectives of the interim remedial action include:

- Providing a cleanup that is protective of human health and the environment;
- Removing soil above Washington State Model Toxics Control Act (MTCA) Method B unrestricted cleanup levels to the extent practicable; and
- Demonstrating that source removal activities have reduced DNT concentrations in site groundwater to concentrations below MTCA drinking water cleanup levels.

This document was prepared in general accordance with requirements listed in the MTCA regulation for interim actions (WAC 173-340-430).

2 Site Background

The former Pacific Powder property is an approximately 1,625-acre site located east of Tilley Road approximately 2 miles east of Maytown (Figure 1). The property is generally flat, with hillsides located on the northern and southern edges. The majority of the property is undeveloped and covered by brush and woodlands. Beaver Creek, running east to west along the southern end of the site, is surrounded by wetlands. A smaller creek (Allen Creek) drains the northwest portion of the site. The Tacoma Western Railway right of way bisects the north end of the property. Woodlands, scattered residential homes, and pastures surround the property.

The property underwent a Site Hazard Ranking by the Thurston County Health Department in 2002 and was scored a 2 on a scale of 1 to 5 (1 being the highest risk, 5 being the lowest).

2.1 Historical Site Use

The site was occupied by an explosives manufacturing plant from the early 1940s until 1994. The former Pacific Powder plant was originally limited to the northcentral portion of the site and consisted of less than 100 acres of land and leased magazine space from adjacent property owners. Prior to 1965, the site contained dynamite production and handling facilities as well as a burn pit located along the southeastern corner of the property (Figure 1). In 1965, the Hercules Powder Company (Hercules) purchased approximately 1,600 acres of land surrounding the plant. Hercules sold the subject property to Ireco Inc. (the predecessor of Dyno Nobel, Inc.) in May 1985. In 1993, Dyno

Nobel (Dyno) sold the property to Citifor, Inc. Dyno leased a portion of the property for one year before decommissioning the plant in late 1994.

The explosives manufacturing plant manufactured primarily dynamite products until 1968. From 1970 until 1994, the primary products were ANFO (a mixture of ammonium nitrate and fuel oil) and slurry explosives (emulsion).

Many buildings located at the areas identified on Figure 2 as the Powder Plant and Culvert Plant are still present. Most of the buildings located in the Old and New Nitrator areas, the Monoethylamine Nitrate (MEAN) Plant, and various powder line buildings (e.g., dynamite and gelatin houses) have been demolished and are overgrown with dense brush (Scotch Broom). Figure 2 identifies the locations of these current and former structures.

2.2 Previous Cleanup Actions

When Citifor purchased the property in 1993, Dyno conducted an environmental investigation and cleanup. Areas remediated included various petroleum-impacted facilities within the Powder Plant, the Alleged Burial Site (ABS) Landfill, the MEAN Plant, the 1970s-Era Fire Works Burn Pits Area, and the Culvert Plant. The four magazines were burned, and the resulting ash was transported off site for disposal. PCB-containing equipment and some asbestos-containing materials were also removed.

Dyno completed two cleanup actions in the vicinity of the Drum Burial Area. The first occurred in the mid-1980s under Ecology oversight and involved cleanup of an old landfill operated by PACCO located east of the Drum Burial Area (Figure 2). In 1993, Dyno conducted a cleanup in the ABS Landfill located immediately east-northeast of the PACCO dump and southeast of the Drum Burial Area (Figure 2). The ABS Landfill was active in the 1970s and consisted of a deep trench about 40 feet wide filled with paper, metal, and plastic debris. Dyno removed several shot bags filled with emulsion product and plastic “chubs” containing residual emulsion. Dyno reportedly continued excavating this area until no additional debris was observed and native soils were encountered. Results of the ABS Landfill cleanup were documented in Dyno’s 1994 and 1995 cleanup reports.

During logging operations conducted at the site in late 1997, buried drums were encountered at the Drum Burial Area (Figure 2). Conrex, under contract with Dyno, performed a site investigation to identify drum burial locations and to define the nature and extent of soil contamination resulting from the buried drums. Drums were excavated from three locations identified as Excavations 1, 2, and 3 on Figure 3. Some of the drums were labeled “DNT.” Though most were empty, one DNT-labeled drum in Excavation 2 contained DNT. Two drums from Excavation 3 were full of material that also appeared to be DNT. Samples of residual material in drums from Excavations 2 and 3 contained detectable DNT. Samples of residual material in drums from Excavation 1 did not contain detectable DNT. Samples of various waste materials collected from the soil surface in Excavations 2 and 3 contained non-detectable or low (less than 0.013 mg/kg) total DNT concentrations. Based on the age of trees growing above the drums, review of aerial photographs (1965, 1970, 1972, 1977, and 1986), and statements by former

employees, it was estimated the drums had been deposited in the early 1970s. Contaminated soil was stockpiled southwest of the excavations.

In April 1998, AETS, currently doing business as ONYX, was contracted to assist Dyno with additional drum and soil removal and to transport contaminated drums off site for proper disposal. During their work, two DNT-containing drums and residual DNT in soil were encountered in Excavation 3. No DNT-containing drums were reported in Excavation 1. AETS reported a drum located next to Excavation 1 that was partially filled with DNT-containing water; however that drum was left there from the earlier Conrex removal action and it is uncertain from which excavation it came. AETS removed buried drums from Excavation 2, but none were reported to contain DNT. AETS began trenching in the vicinity of previous excavations and discovered more drums buried north of Excavation 3. This new buried drum location is identified as Excavation 3A on Figure 3. AETS' trenching completed between Excavations 2 and 3, between Excavations 3A and 1, and west of Excavation 1 (Figure 3) revealed no buried drums. Test pits excavated north of Excavation 3A revealed no buried drums. In summary, buried drums were encountered only in the identified excavation areas, not in any of the adjacent trenches, depicted on Figure 3.

Based on the collective information from the Conrex and AETS removal actions, drums containing DNT were limited to Excavations 2 and 3 (outside of the former Pacific Powder I property boundary). This is consistent with the sworn declaration from a former Hercules employee who worked at the facility between 1964 and 1968, and review of aerial photographs mentioned above.

AETS removed drums as they were discovered, collected soil samples from some of the trenches and excavations, and submitted the samples for analysis of nitroamine/nitroaromatic (NA/NA) compounds (EPA Method 8330). Constituents of concern identified in site soils included isomers of DNT, trinitrotoluene (TNT), and nitrotoluene. The isomers of DNT, specifically 2,4-DNT and 2,6-DNT, were the most pervasive compounds detected at the site. According to AETS analytical results, detected total DNT concentrations in Excavations 3 ranged up to 8,400 mg/kg. For the purposes of this report, total DNT is defined as the sum of the 2,4-DNT and 2,6-DNT concentrations.

Based on the results of analysis, additional excavation was performed in Excavations 1, 2, 3, and 3A, and the excavated soil was stockpiled on site. AETS packaged and transported most of the drums and associated debris for off-site disposal before it was told to stop work in late 1998 or early 1999.

In August of 1999, Hart Crowser covered the soil stockpiles with heavy plastic and placed a plastic liner in Excavation 3. Hart Crowser also assisted Citifor in transporting remaining drums and debris from the site through a contract with AETS (October through December 1999).

2.3 Post-Drum Removal Environmental Investigations

Between October of 1999 and January of 2001, Hart Crowser performed several post-drum removal environmental investigations including:

- Collected and analyzed soil samples from excavations and trenches and soil stockpiles not previously sampled by AETS to fill data gaps (October 1999);
- Completed a cleanup action objective and focused feasibility study (Hart Crowser 2000);
- Installed four groundwater monitoring wells;
- Completed four rounds of quarterly groundwater monitoring in June and October of 2000 and January and May of 2001 (Hart Crowser 2001);
- Collected soil samples from Excavation 3 for total and toxicity characteristic leaching procedure (TCLP) analysis of DNT (January 2001);
- Sampled and analyzed groundwater from four existing monitoring wells and collected and analyzed grab water samples from 11 temporary direct-push wells (July 2002); and
- Excavated and sampled and analyzed soil samples from 12 test pits in the Excavation 3 area and four test pits in the Excavation 1 area (October 2002).

Results from these studies are summarized in the Hart Crowser report titled "Results of Pre-Excavation Sampling and Analysis Program" dated February 18, 2003 (Hart Crowser 2003). A brief overview of the results is presented below.

2.3.1 Soil Quality Data

As shown in Table 1, only one of the 26 soil samples submitted for chemical analysis in October 1999 from Excavations 1 and 2 contained detectable concentrations of DNT. Within Excavation 1, a total DNT concentration of 0.68 mg/kg was detected in sample HC-EX1-T6 collected from Trench 6 (Figure 4). Relatively low concentrations of total DNT were detected in four Excavation 3 soil samples (Tables 1 and 2). The highest concentration (0.61 mg/kg) of total DNT was observed in soil sample HC-EX3-BS2 collected at a depth of 0.1 to 0.5 feet below the current base of Excavation 3. No other Excavation 3 samples contained total DNT in excess of 0.11 mg/kg.

Soil sample analytical results obtained during the October 2002 investigation confirmed that elevated concentrations of total DNT (less than 0.7 mg/kg) are present within Trench 6 in Excavation 1 (Table 3). Detected concentrations of total DNT in samples HC-EX1-T6A-S1 and HC EX1 T6A S2 (0.284 and 0.384 mg/kg, respectively) are consistent with the concentration observed in Trench 6 during Hart Crowser's October 1999 sampling event (0.68 mg/kg in sample HC EX1 T6). Based on the lack of DNT in adjacent trench samples collected within Excavation 1, the occurrence of DNT in Trench 6 appears to be limited in extent.

An elevated concentration of DNT was also encountered in soils located along the eastern boundary of Excavation 3 (HC-EX3-BS20 area, Table 3 and Figure 4). Although total DNT at this sampling location was only reported at a concentration of 0.351 mg/kg, the TCLP DNT leachate concentration associated with the sample indicates that a greater amount of total DNT may be present. Given that DNT was only detected in one of the 32 samples collected within Excavation 3 during the 2002 sampling event, it appears that the DNT occurrence at location HC-EX3-BS20 is relatively isolated (Figure 4).

2.3.2 Groundwater Quality Data

Four rounds of quarterly groundwater monitoring were completed at the site (June 2000, October 2000, January 2001, and May 2001). The first sampling round in June 2000 encompassed a comprehensive suite of chemical parameters (including nitroaromatics and nitroamines, metals, petroleum hydrocarbons, volatile and semivolatile organics, and miscellaneous inorganics) but no analytes were detected above concentrations of concern. The parameter list was reduced to nitroaromatics/nitroamines (NA/NA) during subsequent sampling rounds (Hart Crowser 2001). No NA/NA compounds were detected in the June 2000 or October 2000 groundwater sampling rounds. In January 2001, well HC-MW-3 contained an estimated concentration of 7 ug/L total DNT. In May 2001, a sample from well HC-MW-3 contained 0.44 ug/L 2,4-DNT and 0.63 ug/L 2,6-DNT (i.e., 1.07 ug/L total DNT).

As shown on Figure 5, the distribution of DNT concentrations in Drum Burial Area groundwater during the July 2002 sampling event did not indicate the presence of a well-defined "hot spot." No samples contained DNT at concentrations exceeding laboratory Practical Quantitation Limits (PQLs) of 0.4 ug/L and only 3 of the 15 sampling locations contained DNT concentrations above Method Detection Limits (MDLs). Estimated detected total DNT concentrations shown in Table 4 ranged from 0.0967 ug/L (SP-2) to 0.274 ug/L (SP-3). These concentrations are below to slightly above the CLARC (Version 3.1) Method B groundwater formula value of 0.13 ug/L for 2,4- and 2,6-DNT mixtures.

3 Site Hydrogeology

The uppermost geologic layers at the property are Vashon Drift, containing from youngest to oldest, recessional outwash, till, and advance outwash deposits. The Vashon recessional outwash typically contains unconsolidated sand, gravel, and cobbles, and has a high hydraulic conductivity. The till underlying the outwash is a very dense, gravelly, silty Sand and clayey, sandy Silt and typically is encountered 20 to 30 feet below grade at the property. However, the till is present at ground surface on the hills on the north side of the Tacoma Western Railway tracks. The thickness of the Vashon till varies from 0 to 17 feet across the central portion of the site. Penultimate glacial deposits (predating the Vashon deposits) are also present. The total thickness of glacial deposits in the outwash channel is estimated to range up to 130 feet.

Soils encountered in test pits excavated by Hart Crowser within the Drum Burial Area consisted primarily of light brown, sandy Gravel with abundant cobbles. These observations are consistent with previous investigations. No odors, staining, drums, or other unusual materials were encountered in the test pit excavations.

Based on the conditions observed during installation and sampling of the four monitoring wells in 2000, the water table beneath the site occurs at shallow depths that vary seasonally between about 15 and 20 feet below ground surface within recessional outwash deposits consisting of sand and gravel. During the July 2002 sampling event, groundwater was encountered at approximately 14 feet below grade in the direct-push

borings. Groundwater elevations in HC-MW-1 through HC-MW-4 measured on July 17, 2002, varied only 0.05 foot between wells (Figure 5). Therefore, a groundwater flow gradient could not be reliably estimated. Recent studies by Pacific Groundwater Group indicate that the regional groundwater flow direction is from east to west. However, the presence of hills several hundred yards to the north of the Drum Burial Area (Figure 1) may locally influence groundwater flow to a southerly direction.

During sampling of the Strataprobe temporary wells and the permanent monitoring wells, no odors or sheens were noted in the groundwater.

4 Cleanup Objectives and Criteria

4.1 Remedial Action Objectives (RAOs)

Cleanup actions to be implemented at the Drum Burial Area are designed to address the following RAOs:

- **Prevent Direct Contact with Contaminated Soil.** Prevent direct contact with DNT-impacted soils potentially exhibiting concentrations above MTCA unrestricted use cleanup levels. DNT concentrations in Drum Burial Area soil samples collected by Hart Crowser to date (excluding stockpile samples) have been below the unrestricted use direct contact cleanup level of 1.5 mg/kg.
- **Protect Groundwater.** Excavate impacted soil to reduce leaching of DNT into shallow site groundwater.

4.2 Indicator Hazardous Substances

Indicator hazardous substances (IHSs) were identified for the Drum Burial Area using the criteria outlined in WAC 173-340-708(2). The final list of IHSs for soil and groundwater are a subset of the contaminants detected at the site. The final soil and groundwater IHSs are 2,4- and 2,6-DNT. No other constituents have been identified as significant contributors to overall risks to human health or the environment.

4.3 Cleanup Levels

Soil and groundwater cleanup levels for the final IHSs were developed based on unrestricted land use and potential future utilization of site groundwater as a drinking water source. Cleanup levels are primarily designed to prevent leaching of DNT from site soils at concentrations that will unacceptably impact groundwater quality.

4.3.1 Groundwater

The highest beneficial use for site groundwater is as a potential drinking water source.

Derivation of cleanup levels for the two DNT isomers is somewhat complex. Individually, the 2,4- and 2,6-isomers are not known to be carcinogenic. However,

mixtures of the two isomers are considered carcinogenic. Thus, groundwater and soil cleanup levels for DNT mixtures are considerably more stringent (lower) than those for the individual isomers. Because site groundwater and soil contain mixtures of both isomers, we have selected cleanup levels based on DNT mixtures for the Drum Burial Area.

The calculated CLARC (Version 3.1) Method B formula value for DNT mixtures (0.13 ug/L) is below the laboratory PQLs for 2,4- and 2,6-DNT using EPA Method 8330 (0.4 ug/L). In accordance with WAC 173-340-707, if the valid PQL is greater than the calculated cleanup value, the cleanup level is considered to be achieved based on the PQL (see 173-340-720[7][c]). The analytical method used to quantify DNT in groundwater at the site (EPA Method 8330) is one of the most sensitive and reliable techniques for analyzing nitroaromatics. The PQLs for 2,4- and 2,6-DNT using Severn Trent Laboratory (STL) and EPA Method 8330 are both 0.4 ug/L. Therefore, the Method B groundwater cleanup level for total DNT is 0.8 ug/L (sum of PQLs for 2,4- and 2,6-DNT).

4.3.2 Soil

As discussed previously, the primary objectives of the Drum Burial Area cleanup are to minimize direct contact exposures and degradation of site groundwater quality. Specifically, the cleanup will focus on excavating soils containing concentrations of DNT that exceed MTCA Method B unrestricted direct contact and drinking water protection cleanup levels.

Direct Contact Pathway

Method B unrestricted land use criteria will be applied to Drum Burial Area soils. The Drum Burial Area is zoned as Rural Residential, and adjacent areas are zoned Rural Resource Industrial. The Method B unrestricted use direct contact cleanup level for DNT mixtures provided in Ecology's CLARC database (Version 3.1, 2001 update) is 1.5 mg/kg.

Soil to Groundwater Pathway

Recent amendments to MTCA (dated February 12, 2001) provide several methods for deriving chemical-specific soil cleanup levels based on groundwater protection. Protective soil concentrations are defined as concentrations that will not cause exceedences of applicable groundwater cleanup levels established under WAC 173-340-720 (e.g., 0.8 µg/L for a mixture of 2,4- and 2,6-DNT). One of the most commonly used methods to establish groundwater protection criteria is the three-phase partitioning model. This model was used by Ecology to establish many of the Method A cleanup levels. Based on Ecology's default assumptions, the calculated three-phase soil to groundwater cleanup value for total DNT (0. 0007 mg/kg) is well below soil PQLs for 2,4- and 2,6-DNT. Therefore, compliance with the Method B soil to groundwater cleanup level will be based on PQLs (as discussed previously for groundwater).

During the most recent sampling event conducted in October 2002 at the Drum Burial Area, soil PQLs for 2,4- and 2,6-DNT using STL and EPA Method 8330 ranged between 0.048 and 0.057 mg/kg. PQLs vary depending on the moisture content of the soils. To establish a single PQL for each of the DNT compounds, we utilized the upper 90th

percentile of the PQLs reported during the October 2002 sampling event. For both 2,4- and 2,6-DNT, the calculated 90th percentile PQL values were 0.053 mg/kg. Therefore, the Method B soil to groundwater cleanup level for total DNT is 0.11 mg/kg for total DNT (sum of PQLs for 2,4- and 2,6-DNT).

5 Summary of Remedial Alternatives

The Model Toxics Control Act (MTCA) requires that all cleanup actions protect human health and the environment, comply with cleanup standards, comply with applicable state and federal laws (ARARs), and provide for compliance monitoring. In the Cleanup Action Objectives and Focused Feasibility Study issued in April of 2000 (Hart Crowser 2000), the following alternatives were presented:

- **No Action Alternative.** Under the No Action Alternative, the soil would be left in-place. This option is considered unacceptable because of potential threats to site groundwater quality if no action is taken.
- **Excavation/Disposal Alternative.** Under this alternative, soil exceeding the Method B cleanup level for DNT would be excavated and disposed of at a permitted landfill. This readily implementable alternative would be effective in reducing potential sources of groundwater contamination and results in secure long-term off-site storage of the impacted soil.
- **Biotreatment Alternative.** Biotreatment, including composting, has been used with some success in treating TNT- and DNT-affected soil. Various amendments are added to create a "hot" compost pile that facilitates biodegradation. However, this process takes an extended period of time to reduce DNT concentrations, is more expensive, and may not be able to achieve cleanup levels.
- **Incineration Alternative.** DNT-containing soil could be successfully incinerated. Under this alternative, impacted soil is transported to a permitted incineration facility and is heated to temperatures that will destroy DNT and other nitroaromatic and nitroamine compounds. This process permanently treats the soil and provides the most effective short- and long-term protection. However, incineration is much more expensive than the other alternatives considered and is not required to achieve the RAOs for the Drum Burial Area.

6 Selected Cleanup Action

The proposed cleanup action for the site was selected based on a comparison of each cleanup action alternative with the following criteria [WAC 173-340-360(2) and (3)] and consideration of the MTCA remedy selection requirements:

- Overall Protection of Human Health and the Environment;

- Compliance with Cleanup Standards;
- Use of Permanent Solutions to the Maximum Extent Practicable;
- Compliance with ARARs;
- Provision for Compliance Monitoring; and
- Provision for Reasonable Restoration Time Frame.

Excavation and disposal was selected as the preferred cleanup alternative for soil in the Drum Burial Area. It is relatively easy to implement, reliable, and can provide protection to human health and the environment immediately upon removal of the affected soil from the site. For purposes of potential site exposures, this remedy is permanent. Short-term exposure can be limited by minimizing fugitive soil releases (dust and erosion control, covering of soil stockpiles) and is effective in the long term because the contaminants are removed from the site. Because the soil is placed in a secure landfill, potential future exposure is minimal. The cost of excavation and disposal is moderate relative to the other alternatives considered. We propose to excavate residual soil containing total DNT concentrations greater than 0.11 mg/kg. Excavating soil to achieve this cleanup level will provide the necessary protection of human health and the environment, including protection of site groundwater quality. The existing groundwater quality data indicate minimal groundwater impacts.

Removal of site soils with total DNT concentrations above 0.11 mg/kg as identified in Excavations 1 and 3 would remove a significant mass of DNT which, in turn, would provide a higher degree of confidence that significant groundwater impacts would not appear in the future. To this end, the preferred remedy for the site includes the following elements:

- Pre-excavation trenching along the boundaries of the Drum Burial Area to evaluate whether buried drums or residual DNT are present in areas outside of the existing excavations that have not already been trenched;
- Pre-excavation sampling and analysis to better define the extent of DNT-impacted soil in the vicinity of Excavation 1 Trench 6 (test pit location HC-EX1-T6A) and the eastern portion of Excavation 3 (test pit locations HC-EX3-BS20 and HC-EX3-BS2);
- Excavation and off-site disposal of residual soils containing total DNT concentrations greater than 0.11 mg/kg within Excavations 1 and 3;
- Post-excavation verification sampling and analysis to confirm that residual in-place soils meet the MTCA threefold cleanup criteria (WAC 173-340-740[7]);
- Off-site disposal of site stockpiled soils containing total DNT concentrations greater than 0.11 mg/kg; and
- Four quarters of groundwater monitoring upon completion of remediation activities. If contaminant concentrations measured in site groundwater are below applicable cleanup levels for four successive quarters, groundwater monitoring will be discontinued. In the event that groundwater cleanup levels are not met following one year of quarterly monitoring, we will consult with Ecology to evaluate the need for additional groundwater monitoring.

As discussed in Section 2.2, extensive excavation has been completed in the Drum Burial Area without encountering energetics and explosives (E&E) that could pose an explosive hazard to site workers. Regardless, safety-related precautions to be implemented during the site RI/FS will be implemented during this interim action (e.g., using an excavator equipped with a blast shield). The Health and Safety Plan for this interim action is included in Appendix C.

6.1 Pre-Excavation Trenching, Sampling and Analysis

6.1.1 Exploratory Trenching

Additional exploratory trenching will be performed along the boundaries of the Drum Burial Area to evaluate whether buried drums or residual DNT are present outside of the areas that have already been excavated or trenched. Trenches will be advanced using a trackhoe at approximately 40-foot intervals along the periphery of previously excavated areas, as shown on Figure 6. Each trench will extend for a length of 40 feet; if DNT drums or residual DNT are encountered, then the trench will be extended until a 20-foot length of trench is observed to not contain buried drums or residual DNT. Each trench will be logged by an Aspect Consulting field geologist and the location documented using GPS.

If visually impacted materials other than DNT drums or residual DNT are encountered during trenching, a plan for further investigation will be included as part of the Pre-Excavation Technical Memorandum (Section 6.1.3).

Additional trenching will not be conducted west of Excavation 1 since this area was already extensively trenched by AETS as depicted on Figure 6, and only undisturbed native soil (no drums or debris) were noted in this area. AETS excavated test pits in the area north of Excavation 3A but the extent of that exploration is not well documented; therefore, an exploratory trench will be excavated across this area.

Because most of the drums encountered in the Drum Burial Area were encountered at relatively shallow depths, we anticipate that the trenches will primarily be excavated to depths of 3 to 5 feet. Note that previous excavation work has shown that the native gravel deposits have a greater density than disturbed or fill soils, and disturbed (previously excavated) areas are readily apparent during excavation. Therefore, in areas where only undisturbed native soils are encountered, the trenches will be advanced to depths of 2 to 3 feet. In areas where debris and/or disturbed soils are encountered, the trenches will be excavated to depths of 5 feet or greater to vertically delineate the occurrence, if possible.

If no visually impacted materials are observed in a portion of a trench, that portion will be backfilled to original grade. If visually impacted materials are encountered, the occurrence will be documented, staked, and located using GPS. Soils containing visually impacted materials removed from a trench will be stockpiled in accordance with the provisions of Section 6.2 (e.g., covered with plastic to minimize exposure to rain or wind). The trench will not be widened to remove additional materials during this exploratory phase; rather that will occur as part of the subsequent removal action if needed (Section 6.2). Portions of trenches containing visually impacted materials will remain open pending the removal action but will be covered with plastic sheeting. If

conditions do not allow the trench to remain open, excavated material will be placed back into the trench in a manner that will avoid leaving visually impacted materials on the ground surface; such locations will be staked and the location recorded with GPS. Throughout this exploratory investigation, all materials temporarily excavated and not visually impacted will be returned to the trench and covered with soil.

6.1.2 Test Pit Sampling and Analysis

Four test pit explorations will be advanced along the northern and southern boundaries of Trench 6 within Excavation 1 to define the extent of soils exceeding 0.11 mg/kg of total DNT (Figure 4). The test pits will be excavated within the existing trench and will be advanced to depths of 6 feet below the base of the trench. At each of these locations, we will collect three discrete samples at depths of 2, 4, and 6 feet below existing grade. The samples will be submitted for chemical analysis of nitroaromatics and nitroamines using EPA Method 8330.

As shown on Figure 7, the former Pacific Powder I Burn Pit was located within Excavation 1. In order to evaluate potential soil quality impacts associated with the burn pit, surface and near-surface soils will be sampled from eight shallow test pits (Figure 7). Within each test pit, soil samples will be collected from depths of 0 to 0.5 feet and 1 to 2 feet. The sixteen samples will be analyzed for total metals (including As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn). Four samples from each depth interval (total of 8 samples) will be selected for additional chemical analysis of semivolatile organics (EPA Method 8270) and nitroaromatics and nitroamines (EPA Method 8330) based on visual evidence of contamination.

Seven test pits will be excavated at locations shown near HC-EX3-BS20 and HC EX3 BS2 to define the spatial and vertical extent of DNT-containing soils in this area. Proposed test pit locations are shown on Figure 4. Test pits excavated within the interior of Excavation 3 will be sampled at depths of 2, 4, and 6 feet below the base of the excavation. Test pits excavated to the east of the excavation (or, if suitably located, pre-excavation trenches installed as described in Section 6.1.1) will be sampled at depth intervals of 2, 5, and 8 feet below ground surface. These are the same depth intervals used in the pre-excavation sampling and analysis conducted in the Drum Burial Area in 2002 to identify hot spots in the excavation areas (Hart Crowser 2003). The samples will be submitted for chemical analysis of nitroaromatics and nitroamines using EPA Method 8330.

Soil samples will be collected from the interior portion of the backhoe bucket, homogenized in a stainless steel bowl, and placed into clean glass jars provided by the laboratory. All sampling equipment will be decontaminated with Alconox soap and deionized water. Samples will be stored in coolers with blue ice and transported the same day to STL in Tacoma for chemical analysis.

If pre-excavation soil sampling results do not effectively define the extent of DNT-impacted soils, additional test pits may be installed and sampled. Ecology will be consulted regarding proposed locations and sampling details for these additional pre-excavation test pits (if needed).

Additional details regarding procedures used to collect and handle soil samples are provided in the Sampling and Analysis and Quality Assurance Plans provided in Appendices A and B, respectively.

6.1.3 Pre-Excavation Technical Memorandum

Results of the pre-excavation exploratory trenching and test pit sampling and analysis program will be documented in a technical memorandum that will be submitted to Ecology. The technical memorandum will include a description of work completed, a map documenting locations of exploratory trenches, test pits, and occurrences of visually impacted material (if any), descriptions of materials encountered, and sampling and analysis results. The memorandum will describe the extent of materials to be removed under this interim remedial action, whether the same as currently described in this Plan or different as a result of the pre-excavation work.

6.2 Remedial Action Field Procedures

This section presents the procedures to be followed during the interim remedial action after exploratory data obtained as described in Section 6.1 are available and have been interpreted.

6.2.1 Site Clearing and Layout

Vegetation Removal

Much of the area to be excavated contains fairly dense accumulations of Scotch Broom. Vegetation will be cleared from the surface as excavation proceeds and will remain on site. The quantity of soil removed with vegetation will be minimized.

Demolition

No demolition is anticipated. There are no known structures in the vicinity of the excavation areas.

Site Layout

A design plan is shown on Figure 8, and includes the location of work zones, existing stockpiles, proposed stockpile areas, and staging areas. The exclusion zone (area where only appropriately health and safety trained workers will be allowed to enter) and estimated extent of excavation will vary depending on the actual extent of contaminated material removed from the site. Contractor staging areas for equipment and supplies will be limited to the areas shown. Stockpiles will be maintained at locations shown on Figure 8. Visually impacted materials encountered during the pre-excavation exploration (Section 6.1) may be temporarily stockpiled in areas different than the main stockpile area shown on Figure 8. Stockpiles of DNT-impacted soil and clean overburden will be kept separated. Stockpiles will be constructed and leachate (if present) from DNT-impacted soil stockpiles will be collected and disposed of as described in Section 6.2.7.

6.2.2 Utility Location

No abandoned or active utilities are known to be present in the project area.

6.2.3 Discovery and Handling of Visually Impacted Materials

Based on the degree of cleanup activities performed already in this area, discovery of visually impacted materials, including DNT-containing drums, is not anticipated. However, in the event that visually impacted materials are encountered, site personnel will proceed as follows:

1. Notify the Aspect Consulting Project Health and Safety Manager and Ecology. A written description and a sketch of the location of the material will be documented in the field notebook.
2. Based on recommendations from the Project Health and Safety Manager and the contractor, and based on the type of material encountered, appropriate equipment (in addition to blast shields) will be used during removal of materials (if encountered).
3. Visually impacted materials will be removed with care taken to avoid spreading the contamination into an uncontaminated area.
4. The removed materials will be stockpiled separately from contaminated and uncontaminated soils as described in Section 6.2.7. The stockpiled materials will be designated for appropriate disposition as discussed in Section 6.2.8.

6.2.4 Soil Excavation

Previous excavations performed on the site have remained fairly stable at slopes of 1H:1V. Excavations performed as part of this work will also generally be sloped at 1H:1V or as directed by the field supervisor. The Aspect Consulting field supervisor may modify this requirement if greater protection is required based on site conditions. During all excavation activities, protection monitoring will be performed, as described in Section 7.0.

Excavation Sequence

For the two areas with identified DNT contamination exceeding cleanup goals (Excavation 1 and Excavation 3), the preliminary extent of excavation is shown on Figure 4. Excavation boundaries will be modified based on the results of pre-excavation sampling and analysis (see Section 6.1). At the Excavation 1 area, initial excavation will likely proceed to 8 feet below ground surface (approximately 5 feet below current base of excavation), and resulting soil will be managed as contaminated.

The base of Excavation 3 is currently approximately 3 feet below ground surface. Based on sample analytical results from HC-EX3-BS20, soils present at depths of 3 to 6 feet below ground surface (0 to 3 feet below current excavation base) do not exceed the Method B DNT soil to groundwater cleanup level. However, sample HC-EX3-BS2 collected within 0.5 foot of the excavation base does exceed the DNT cleanup level. Additional soil quality data collected during the pre-excavation sampling event will be used to better define the vertical and spatial extent of soils exceeding the DNT cleanup level. Clean overburden and DNT-contaminated subsurface soil will be stockpiled in separate areas as indicated on Figure 8.

After initial excavation, verification samples will be collected as described for Performance Monitoring in Section 7.0, and excavated areas will remain open until

verification sample analytical results are received. During this period, excavation areas will be secured as described in Section 6.2.9. If verification sample analytical results are above cleanup levels, material within approximately 100 square feet of the sample location will be excavated. Verification samples in the newly excavated area will again be collected and analyzed, and that portion of the excavated area will remain open until verification sample analytical results indicate acceptable DNT concentrations, or until it is determined that additional excavation is not practical (see Section 7.0).

At the completion of the project, the Final Report will include a map showing the verification sample locations and a tabular summary of analytical results to document the cleanup completed.

Potential Mechanical Screening

It is likely that DNT in Drum Burial Area soils would preferentially adhere to the finer-grained (sand and silt) soil fraction rather than the coarse-grained (gravel and cobble) fraction. Therefore, mechanical screening provides a potential means to reduce the volume of contaminated soil requiring off-site disposal by segregating the coarse-grained fraction from the fine-grained soil fraction.. The coarse-grained fraction must be shown to be uncontaminated if it is to be left on site. For DNT, the soil-to-groundwater exposure pathway (0.11 mg/kg soil cleanup level) is more stringent than the human direct contact exposure pathway (1.5 mg/kg unrestricted soil cleanup level; see Section 4.3.2). Therefore, demonstrating that the soil is protective of groundwater also demonstrates it to be protective of human direct contact for unrestricted use.

Prior to initiation of the interim remedial action, a pilot test will be performed to assess the effectiveness of using mechanical screening to segregate a clean coarse-grained fraction. If the pilot test satisfactorily demonstrates that the DNT concentrations associated with the screened coarse-grained fraction are protective of groundwater, mechanical screening can be implemented as part of the interim remedial action and the screened coarse-grained fraction can be left on site while the screened finer-grained fraction is disposed of off site. Conversely, if the pilot test documents that DNT concentrations associated with the screened coarse-grained fraction are not protective of groundwater, the entire volume of soil will be disposed of off site without mechanical screening.

A pilot test plan outlining the procedures for mechanical screening and associated sampling and analysis will be prepared for Ecology review and approval prior to implementing the pilot test. Following completion of the pilot test, results of the pilot test will be documented in a technical memorandum that will be submitted to Ecology. The technical memorandum will describe the work completed and sampling and analysis results, and provide a recommendation for whether or not to include mechanical screening as part of the interim remedial action.

6.2.5 Excavation Backfilling

After analytical results on verification samples indicate that in-place soil is clean, excavated areas will be backfilled. Backfill will occur in lifts not to exceed 12 inches and will be compacted using the backhoe bucket as the material is placed. Material to be used for backfill will include clean overburden, coarse material from the screening

process if implemented, and imported fill material (including clean material from portions of the site that were not used for industrial purposes such as the area north of the railroad tracks). Although no backfill specification is designated, the backfill should be predominantly sand and/or gravel that is low in organic or clay content. Finer-grained materials may be used as surficial and near-surface backfill.

6.2.6 Site Restoration

Site will be returned to original grades. Surface material will be graded smooth to avoid creating large depressions in which ponding of surface water could occur.

6.2.7 Soil/Leachate Handling

Stockpiles

Excavated DNT-contaminated soil will be placed in temporary stockpiles. Excavated material from the Trench 6 and Excavation 3 areas will be segregated. Clean overburden removed from the excavations will be placed in the clean stockpile area and sampled and analyzed to confirm that DNT concentrations are below cleanup levels.

Stockpiles will be constructed to protect stored material from erosion by wind and rain. Contaminated soils and visually impacted materials will be stored on a 10-mil nominal thickness impermeable polyethylene liner for short-term storage (less than 90 days) prior to mechanical screening and will be covered with a polyethylene liner (minimum 6-mil thickness). Berms will be constructed surrounding contaminated soil and visually impacted material stockpiles to contain any leachate. The top liner will be weighted down with a series of ropes/sandbags or netting to prevent uncovering from wind shear. Construction and placement of these liners will be such that surface water runoff and rain do not come in contact with the contaminated soils/materials.

Any stockpiles left in place will be inspected and maintained regularly to ensure the cover and bottom liner material remain intact and that any liquid leachate is contained in the leachate collection system described in the next subsection.

Stockpiles will be placed in an area that has been graded smooth. All material that may puncture the liner, including large rocks, branches, or metal debris will be removed prior to placement of the stockpile liner. Where necessary, the area will be graded to ensure that water drains to the collection sump described in the next subsection.

Leachate Collection

Soil excavated from the Drum Burial Area should primarily consist of relatively dry granular materials. It is not anticipated that stockpiled soils will generate liquids. However, if unexpectedly wet soils are encountered, contaminated soil stockpiles will be constructed to drain generated liquids (primarily water that leaches out of excavated soil) to a common sump. The sump will be excavated from the ground surface, lined with polyethylene, and have a layer of clean gravel placed in the bottom to hold it in place. A berm will be constructed around the sump to prevent inflow from sources other than DNT-impacted soil leachate.

Liquid in the sump (if present) will be pumped into a chemically compatible container. The contractor will minimize generation of wastewater through best management

practices, including diverting runoff outside the stockpile areas and draining the rain falling on the stockpile covers outside the drain collection area. Water draining from the clean overburden stockpiles will be directed away from the sump that collects water from the DNT-impacted soil stockpiles. Accumulated liquids will be disposed of at off-site disposal facility.

Soil Containers

Soil destined for off-site disposal will be placed in lined, transportable containers that will be kept in the designated stockpile area (see Figure 8). After soil has been placed in the containers and sampled for waste designation in accordance with disposal facility requirements, the containers will be covered and secured. The condition of the containers and soil will be determined during weekly inspections. Containers will be managed as if they were hazardous waste, but labeled "Pending Analysis" until such time as test results on the corresponding waste designation samples demonstrate that the soil is hazardous or not. Based on analytical results, the container labels will be changed to reflect the waste's regulatory status as hazardous or non-hazardous.

6.2.8 Transportation and Disposal Requirements

During this removal activity the following materials may be generated:

- **Non-Hazardous Solid Debris.** Miscellaneous solid waste including domestic trash;
- **DNT-Containing Drums.** Drums containing DNT residual;
- **Other Visually Impacted Materials.** Materials, other than DNT-containing drums, that are suspected to be contaminated based on visual evidence;
- **Hazardous Waste, DNT-Contaminated Soil.** DNT-contaminated soils that exceed the Toxicity Characteristic (TC) for DNT or designate as dangerous waste per the toxicity criteria (WAC 173-303-100[5]) (depending on test results);
- **Non-Hazardous DNT-Contaminated Soil.** DNT-contaminated soils that exceed the Method B total DNT cleanup level but not TC or toxicity criteria (depending on test results); and
- **Non-Hazardous or Hazardous, DNT-Contaminated Water.** Decontamination liquids and leachate from contaminated stockpiles.

Each of these classes of materials has differing transportation and disposal requirements as discussed below.

Non-Hazardous Solid Debris

DNT-contaminated solid materials including personal protective equipment (PPE), and decontamination equipment will be disposed of at an off-site solid waste disposal facility.

DNT-Containing Drums

Drums that meet the definition of "empty" in WAC 173-303-160 will be handled as solid waste in accordance with that rule. DNT-containing drums that do not meet the definition of "empty" in WAC 173-303-160 will be containerized and transported to Chemical Waste Management in Arlington, Oregon.

Other Visually Impacted Materials

Visually impacted materials other than DNT-containing drums will be disposed of in accordance with applicable federal and state regulations, based on waste designation including sampling and analysis. One 5-point composite sample per 250 cubic yards of such material will be collected for waste designation purposes. Chemical analyses to be conducted will depend on the nature of the material and requirements of the prospective disposal facility. Once the waste type is designated, the material will be containerized and transported to an appropriate off-site disposal facility.

Hazardous Waste, DNT-Contaminated Soil

During the AETS removal action, Ecology made the determination that the DNT encountered is not a listed waste. Therefore, DNT-contaminated soil will be disposed of as hazardous waste if the Toxicity Characteristic Leaching Procedure (TCLP) 2,4-DNT concentration in the soil leachate exceeds 0.13 mg/L, or if the soil designates as dangerous waste per the toxicity criteria (WAC 173-303-100[5]). DNT-contaminated soil that is classified as hazardous or dangerous waste will be containerized and transported to Chemical Waste Management in Arlington, Oregon.

Non-Hazardous DNT-Contaminated Soil

Soil will be disposed of as DNT-contaminated, non-hazardous waste if total DNT concentration in the soil exceeds 0.11 mg/kg, and TCLP 2,4-DNT test results do not exceed 0.13 mg/L, and the constituent concentrations do not meet the dangerous waste toxicity criteria. DNT-contaminated soil that is classified as non-hazardous will be containerized and transported to Columbia Ridge Landfill in Oregon for disposal.

Non-Hazardous or Hazardous, DNT-Contaminated Water

The leachate from stockpiles will be collected, sampled and analyzed, and disposed of at an appropriate off-site facility.

Shipping Papers for Transportation of Hazardous Waste

Hazardous waste transported off site, if any, will be accompanied by a Uniform Hazardous Waste Manifest (40 CFR 262) and a LDR certification.

6.2.9 Environmental Protection and Safety Procedures

The following is a description of actions to be taken to provide environmental, site, and spill control during the cleanup action.

Environmental Control

All work will be performed in a manner as to minimize the pollution of air, water, or land and to control noise and dust within reasonable limits or limits established by federal, state, and local laws and regulations. Careful considerations will be made to avoid contamination spread via dust, permeation from stockpiles, and air. There is no surface water within the vicinity of the planned excavation work and any runoff in the project area will readily infiltrate rather than flowing overland for any appreciable distance. Therefore, surface water protection will be achieved through lining, covering, and berming stockpiles and collection of leachate if generated (described in Section 6.2.7).

No potable water source is located in the area, so there is negligible risk of storing soil within the restricted range of a drinking water supply.

Dust will be carefully controlled at the site. All soil stockpiles will be covered to prevent blowing. During excavation, dry soil will be sprayed with water as needed to minimize the potential for generating dust. If implemented, mechanical screening will be performed in a designated area based on the pilot test results to minimize potential for contaminant spreading to the clean overburden stockpile. During transport, reasonable precaution will be taken to prevent particulate matter from being emitted into the air by covering the loads.

Site Control

The site is within a controlled facility with fencing and a locked gate. Public access to the site is limited, and a locked gate blocks the road entering the site. Warning tape will be used to clearly mark open excavations.

Spill Control

Spill control will be limited to dealing with any leaks or spills of stockpile leachate or fuel and oil from construction equipment. Any leaks or spills will be promptly cleaned up and contaminated soil will be added to the stockpiles for treatment and disposal. No other spillable materials are anticipated during implementation of the IRAP.

Health and Safety

If site conditions change which may affect safety or health, the HSP will be amended prior to commencing work. A Field Health and Safety Manager will be on site whenever work is being conducted. Responsibilities of the Field Health and Safety Manager are detailed in the HSP presented in Appendix C.

7 Compliance Monitoring

Compliance monitoring is performed to confirm that human health and the environment are protected during the construction, operation, and maintenance of the cleanup action. Compliance monitoring also confirms that the cleanup action has attained the cleanup standards prescribed by the cleanup plan and confirms the long-term effectiveness of the remedial action. Compliance monitoring at the site will be performed as follows:

- Protection monitoring will be implemented during construction by ensuring that site workers are appropriately trained in health and safety and that health and safety and contingency plans for encountering hazardous materials are available during construction. Impacted soils will be stockpiled with appropriate contact and runoff controls.
- Performance monitoring will be conducted during construction, which will include verification and stockpile sampling and analysis. Verification soil samples will be collected from the sidewalls of the excavation to confirm that remaining soils do not contain DNT concentrations above cleanup levels. One shallow (in the 0- to 4-foot-

depth interval) and one deep (in the 4- to 8-foot-depth interval) sample will be collected for every 50 linear feet of side wall. One bottom sample will be collected for every 250 square feet of excavated area. Samples will be analyzed for nitroaromatics and nitroamines using EPA Method 8330. If verification sample analytical results exceed site cleanup levels, additional soil will be excavated (if practicable) and additional verification samples will be collected. If verification sample results still exceed cleanup levels following this second excavation event (if necessary), Ecology will be consulted regarding the need for additional soil removal or use of alternative cleanup approaches.

- If mechanical screening is performed, the screened finer-grained fraction will be stockpiled and then sampled to designate the material for off-site disposal. One five-point composite sample will be collected from each 250 cubic yards of stockpiled material and analyzed for TCLP nitroaromatics and nitroamines using EPA Methods 1311/8330.
- Stockpiles of clean overburden will also be sampled and analyzed to confirm that they do not contain DNT concentrations in excess of the Method B cleanup level. Clean stockpile sampling frequency will be based on Ecology guidance (Guidance for Remediation of Petroleum Contaminated Soils dated April 1994) calling for five discrete samples per 500 cubic yards of stockpiled material and 10 samples per 2,000 cubic yards.
- Confirmation monitoring will be implemented to ensure the long-term effectiveness of the remedial action and contingency response actions (if necessary) to protect human health and the environment. After excavation and site restoration, confirmation sampling of groundwater will be performed to evaluate remediation effectiveness. Two new monitoring wells (HC-MW-5 and HC-MW-6 shown on Figure 5) will be installed west of the Drum Burial Area to better define groundwater quality downgradient of the site. The wells will be installed using a hollow-stem auger drilling rig and will be screened to bisect the water table. The wells will be developed and surveyed into the existing well network.

Four quarters of groundwater monitoring will be performed upon completion of remediation activities. Groundwater samples will be collected from existing wells HC MW 1 through HC MW 4 and the two newly installed wells using low flow sampling techniques. The samples will be analyzed for nitroaromatics and nitroamines by STL using EPA Method 8330. Groundwater pH, temperature, specific conductivity, and water levels will be measured in the field.

Brief data reports summarizing the results of the groundwater sampling and analysis will be submitted following each quarterly sampling event. If contaminant concentrations measured in site groundwater are below MTCA Method B drinking water cleanup levels for four successive quarters, groundwater monitoring will be discontinued. In the event that groundwater cleanup levels are not met following one year of quarterly monitoring, we will consult with Ecology to evaluate the need for additional groundwater monitoring.

7.1 Points of Compliance

Soil. The determination of adequate soil treatment will be based on the remedial actions' ability to comply with the soil cleanup levels established for the site. The point of compliance for direct contact soil cleanup levels will be the upper 15 feet of soil at the site.

Groundwater. The determination of adequate groundwater treatment will be based on the remedial actions' ability to comply with the groundwater cleanup levels established for the site. Achievement of cleanup levels in groundwater shall be measured at compliance monitoring wells HC-MW-1 through HC-MW-6

8 Schedule

A proposed schedule for pre-excavation investigation and remedial construction activities is included in Table 5.

9 Institutional Controls

Institutional controls are measures undertaken to limit or prohibit activities that may interfere with the integrity of a cleanup action or result in exposure to hazardous substances at the site. At this time, institutional controls are not necessary because this IRAP is designed to meet cleanup levels for soil and groundwater.

10 Determinations

Section 173-340-360(10) of the MTCA regulation states that the draft IRAP should include a preliminary determination that the cleanup action complies with subsections (2) and (3) of WAC 173-340-360. As specified in those subsections, the selected cleanup action is designed to accomplish the following.

10.1 Protect Human Health and the Environment

Implementation of the preferred remedial alternative will minimize potential exposures from each of the pathways identified as being of potential concern. Removing DNT-impacted soil is the most effective alternative for minimizing direct contact and leaching into groundwater.

10.2 Compliance with Cleanup Standards per WAC 173-340-700 through -760

The goal of this cleanup action is to protect groundwater quality and prevent direct contact with affected soils. The cleanup action is intended to meet cleanup standards for groundwater and soil. If cleanup standards are not met, additional action will be taken in coordination with Ecology to ensure the goals are realized to the extent practicable.

10.3 Compliance with Applicable State and Federal Laws per WAC 173-340-710

The cleanup action will comply with all Applicable or Relevant and Appropriate Requirements (ARARs), as required in Section 173-340-710 of the MTCA. The following ARARs have been identified:

- Model Toxics Control Act (MTCA 70.105D RCW, Chapter 173-340 WAC). MTCA contains detailed requirements and Washington State's expectations for cleanup of contaminated sites.
- State Environmental Policy Act (SEPA - 43.21 RCW, Chapter 197-11 WAC). An environmental checklist has been developed pursuant to SEPA and MTCA and has been submitted to Ecology.
- Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 WAC). This regulation contains requirements for abandonment and construction of resource protection wells.
- Dangerous Waste Regulations (Chapter 173-303 WAC). This regulation addresses requirements for identification and proper management of dangerous wastes.

No federal permits are required for the cleanup. State and local permits are exempted pursuant to the Agreed Order. Ecology and Citifor Inc. will ensure that the cleanup action meets the substantive requirements of all state and local permits that apply to this project.

10.4 Provide Compliance Monitoring per WAC 173-340-410

Performance monitoring will be conducted during construction and will include verification and stockpile sampling and analysis. Confirmation groundwater monitoring will be conducted after the excavation is complete to confirm and ensure that cleanup actions have attained cleanup and performance standards. Protection monitoring will be used to ensure that human health and the environment are being adequately protected during construction and operation of the cleanup actions.

10.5 Use Permanent Solutions to the Maximum Extent Practicable per WAC 173 340-360(4), (5), (7), and (8)

Excavating impacted soil permanently removes contaminants from the site. The preferred remedy is protective of human health and the environment, can be effectively implemented, and is cost-effective. It is the most practicable alternative for addressing the primary exposure pathways of concern.

10.6 Short-Term Effectiveness

Short-term effectiveness [WAC 173-340-360(5)(iii)] considers how the cleanup action will impact human health and the environment during implementation and prior to achievement of cleanup levels. The selected alternative will involve earth moving and excavation activities that could cause contaminated materials to be released through dust, increased erosion potential, or removal from the site on vehicles. These potential impacts will be mitigated through best management practices. Exposure to contaminated materials that may be encountered during construction will be addressed through a worker health and safety plan and by complying with OSHA standards.

When the preferred remedial action is implemented, it will be immediately effective in preventing human direct contact or ingestion of DNT.

10.7 Long-Term Effectiveness

Long-term effectiveness [WAC 173-340-360(5)(ii)] is measured in terms of the magnitude of residual risk and the adequacy and reliability of the cleanup action.

The proposed cleanup action effectively prevents human exposure over the long term by removing soil impacted with hazardous constituents. Natural attenuation will continue to reduce the quantity of DNT in soil and groundwater (if any) over the long term.

10.8 Permanent Reduction of Toxicity, Mobility, or Volume

This evaluation criterion addresses the preferential implementation of treatment technologies that permanently and significantly reduce toxicity, mobility, and volume of the hazardous substances present. DNT-impacted soils disposed of off site will be placed in a secure permitted landfill that will minimize potential exposure and contaminant migration. Natural attenuation will also decrease the volume of residual DNT in soil and groundwater (if any) over the long term.

10.9 Ability to be Implemented

The proposed cleanup action involves conventional technologies (e.g., excavation, off-site disposal) that are easily implemented.

10.10 Cleanup Cost

Cleanup costs for the selected alternative is less than the other active remediation alternatives evaluated (see Hart Crowser 2000 for cost evaluation), but excavation is likely the most cost-effective option.

10.11 Consider Public Concerns per WAC 173-340-600

The public will be given the opportunity to comment on this document during a 30-day public comment period. Ecology will consider all comments received. At the end of the comment period, Ecology will prepare a responsiveness summary listing each comment received and Ecology's response to the comment.

11 Final Report

At the completion of the project, a final report will be completed. At a minimum the report will include:

- Discussion of activities completed, including deviations from this interim remedial action plan;
- Detailed sample information, including location, matrix, analytical methods, Quality Assurance/Quality Control (QA/QC) results, comparison of field and verification soil sample analytical results;
- Maps illustrating work areas, sample locations, important features, residual contamination locations, and other useful information;
- Documentation of work, including photographs, logs, and monitoring records; and
- Waste categorization and disposal documentation, including inventory of waste removed and volumes, waste disposal facilities used, waste transportation documents, and disposal receipts.

12 References

Hart Crowser 2000. Cleanup Action Objectives and Focused Feasibility Study – Drum Burial Area Soil Cleanup, Former Hercules Powder Site, Maytown, Washington. May 17, 2000.

Hart Crowser 2003. Results of Pre-Excavation Sampling and Analysis Program – Drum Burial Area, Former Pacific Powder Site, Maytown, Washington. February 18, 2003.

13 Limitations

Work for this project was performed and this report prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of Citifor, Inc. for specific application to the referenced property. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

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APPENDIX A

Sampling and Analysis Plan
Drum Burial Area
Maytown, Washington

A Sampling and Analysis Plan

A.1 Soil Sampling Requirements

A.1.1 General Procedures for Soil Sampling

Discrete grab soil samples will be collected as part of pre-excavation characterization and cleanup verification sampling. Waste designation samples will generally consist of 5-point composites. To minimize negative bias potentially caused by photodegradation of DNT, all samples will be collected at least 0.5 foot below exposed soil surfaces. Sample containers will be filled quickly to minimize exposure to sunlight.

For safety, if the samples are being collected from the side walls or bottom of an excavation that does not have shoring sufficient for human entry, the samples will be collected from the backhoe bucket. Care will be taken to avoid collecting soils in contact with the sides of the backhoe bucket. Stainless steel spoons and bowls will be used to collect and homogenize soil prior to placement in sample containers.

A.1.2 Decontamination Procedures

General decontamination procedures are discussed below. Additional detail regarding personnel decontamination procedures is provided in the Site-Specific Health and Safety Plan (HSP, Appendix C).

Decontamination will be limited to personnel decontamination and final decontamination of excavation equipment at the end of the project. Truck routes will be maintained away from contaminated soil, so that truck tires will not have to be decontaminated before leaving the site.

Decontamination Area

The contractor will establish a decontamination area for personnel and equipment. Prior to exiting the excavation area, all personnel and small equipment will be decontaminated to minimize the potential for off-site migration of DNT-contaminated material and to remove any hazards to personnel. Containers will be available at the decontamination area to segregate domestic waste, recyclable materials, and DNT-contaminated items.

Decontamination will be conducted on a minimum 10-mil impermeable liner so that any potentially contaminated fluids or solids generated can be readily collected and stored.

Decontamination Procedures

Basic decontamination procedure for personnel and equipment is as follows:

- Personnel contamination reduction will be accomplished prior to leaving the work zone. Boots and gloves will be washed in the decontamination area as described in the site HSP. All disposable PPE will be handled as non-hazardous solid waste. Decontamination liquids will be treated with the stockpile leachate as described in Section 6.2.7.

- Small equipment will be handled in a manner that reduces its contact with contamination and will be decontaminated on site using a brush, water, and a detergent solution.
- Heavy equipment (e.g., backhoe) will be decontaminated only before leaving the project site. Gross contamination of the excavator bucket will be removed with a brush or pressure washer/steam cleaner in the excavation area and will be further cleaned with a detergent solution and sorbent pads. Transferring of contaminated soil to the transport vehicles will be conducted over an impermeable liner to contain any spillage that may occur.
- All non-disposable sampling equipment used in soil sampling will be decontaminated before collection of each sample. The decontamination sequence consists of a scrub with a phosphate detergent (e.g., Alconox) solution, followed by potable/tap water rinse, and finished with thorough spraying with deionized, distilled water.

A.2 Groundwater Monitoring Well Installation and Sampling Procedures

Monitoring wells HC-MW-5 and HC-MW-6 will be installed using a hollow-stem auger drill rig and will consist of 2-inch-diameter PVC plastic well casing with 10-foot-long, 20-slot well screens. The well screens will be placed across the water table. Sand packs will be installed from 1 foot below to 2 feet above the screen intervals. The wells will be finished with steel stick-up monuments.

Wells HC-MW-5 and HC-MW-6 will be developed using a submersible electric pump and/or bailer. A minimum of 10 casing volumes of water will be removed during development, plus a volume equal to any water added during drilling. Groundwater sampling results will be used to characterize the purge water and to determine appropriate disposition. The wells will be allowed to stabilize for at least 24 hours before being sampled.

The six site monitoring wells (HC-MW-1 through HC-MW-6) will be purged and sampled using low-flow methods (less than 0.5 liter per minute) using a peristaltic pump equipped with dedicated tubing. During purging and immediately prior to sampling, the field representative will measure groundwater pH, temperature, specific conductivity, turbidity, and dissolved oxygen in the field. Groundwater will be purged until the field parameters stabilize. Field groundwater measurements and observations will be recorded on groundwater sampling field forms.

A.3 Sample Documentation Procedures

A.3.1 Field Notebooks

While conducting fieldwork at the site, the field representative will document pertinent observations and events in a logbook and on a daily field report, and provide photographic documentation of the sampling effort. The logbook will contain a description of each field activity and associated details such as time, date, and field conditions. The logbook (a bound notebook) will be made from water-resistant paper. A copy of the logbook will be kept in Aspect Consulting's job file.

A.3.2 Sample Labeling and Nomenclature

Sample labels will clearly indicate the sample number, date, sampler's initials, parameters to be analyzed, preservative added if any, and any pertinent comments.

A.4 Sample Handling Procedures

A.4.1 Sample Containers

The volumes and containers required for sampling activities are included in Table B 1. Pre-washed sample containers will be obtained from the analytical laboratory. All sample containers will be maintained under chain of custody procedures from the time of receipt to the time the sample is transferred to the laboratory for analysis.

A.4.2 Sample Management

Upon collection, samples will be placed upright in a cooler. Cushioning material will be placed on the bottom of the cooler. Blue ice packs or ice will be placed in each cooler to meet sample preservation requirements. Additionally, cushion material will be placed in the remaining space of the cooler along with a sealed waterproof bag containing a chain of custody form.

Samples will be delivered to the analytical laboratory in a sealed cooler. Upon sample receipt, the laboratory will fill out a cooler receipt form to document sample delivery conditions. A designated sample custodian will accept custody of the shipped samples and will verify that the chain of custody form matches the samples received.

Samples that cannot be delivered to the laboratory by the field representative will be packaged as described above and shipped according to the following procedures:

- The signed and completed chain of custody will be placed in a sealable plastic bag and placed inside the cooler.
- The lid will be secured by taping and the cooler will be wrapped completely with strapping tape at a minimum of two locations. Labels will not be covered with sealing tape.
- The completed shipping label will be attached to the top of the cooler.
- Signed custody seals will be affixed on the front of the cooler.

A.4.3 Sample Custody

The purpose of sample custody is to create an accurate, verified written record, which can be used to trace the possession and handling of the samples from the moment of collection until receipt by the laboratory. Adequate sample custody will be achieved by means of appropriate field and analytical documentation. Chain of custody will be maintained for all samples collected during this project. For this project, a sample is defined as in someone's custody if:

- It is in an authorized person’s actual physical possession;
- It is in an authorized person’s view, after being in their physical possession;

- It is in an authorized person's physical possession and then locked or otherwise sealed so that tampering will be evident; or
- It is kept in a secure area, restricted to authorized personnel only.

Chain of Custody Forms. A chain of custody form will be completed and will accompany every sample and shipment of samples to the laboratory to establish the documentation necessary to trace sample possession from time of collection. The information on the chain of custody form will match the information on the sample bottles.

Chain of custody forms will be completed for every cooler, and placed in a sealable plastic bag. The form will contain the following information:

- Sample number;
- Signature of collector, sampler, or recorder;
- Date and time of collection;
- Place of collection;
- Sample type;
- Analyses requested;
- Signatures of persons involved in chain of possession; and
- Inclusive dates of possession.

The field representative will send the original chain of custody forms to the laboratory with the samples and retain copies for the project files.

The laboratory portion of each form must be completed by personnel at the analytical laboratory and will contain the following information:

- Name of person receiving the sample;
- Laboratory sample number;
- Date of sample receipt; and
- Sample condition and temperature.

Transfer of Custody and Shipment. When transferring the samples, the individuals relinquishing and receiving the samples will sign, date, and note the time on the chain-of-custody form. Samples will be properly packaged for shipment, as described in Section A.4.2 above. Samples will be shipped by courier or hand carried by a field team member to the analytical laboratory. The analytical laboratory coordinators will be notified of when and how samples were sent.

Upon receipt of each sample cooler, and after verification of the chain of custody records, the project laboratories will fill out a Cooler Receipt Form documenting the condition of the samples.

APPENDIX B

Quality Assurance Project Plan
Drum Burial Area
Maytown, Washington

B Quality Assurance Project Plan

The purpose of the Quality Assurance Project Plan (QAPP) is to define, in specific terms, the quality assurance (QA) and quality control (QC) objectives, organization, and functional activities associated with the sampling and analysis of soil and groundwater samples obtained during this project.

B.1 Analytical Procedures

Soil and groundwater samples collected as part of this sampling program will primarily be analyzed for nitroaromatics and nitroamines by EPA Method 8330. Soil samples collected from shallow test pits installed in Excavation 1 will also be analyzed for total metals (including As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn by EPA Method 6010/7000 series) and semivolatile organics (EPA Method 8270).

Severn Trent Laboratories will analyze the project samples. The address and contact for the laboratory is listed below.

Project Laboratory:

Severn Trent Laboratories
5755 - 8th Street East
Tacoma, WA 98424
Contact: Matt Essig (253) 922-2310

As shown on Table B-1, Practical Quantitation Limits (PQLs) for nitroaromatics and nitroamines in soil samples will generally range from approximately 0.1 mg/kg for nitrotoluenes to 0.05 mg/kg for other nitroamine and nitroaromatic compounds including 2,4- and 2,6-dinitrotoluene (DNT). PQL is defined as the lowest reproducible concentration at which a chemical can be accurately and reproducibly quantitated for a given sample. The PQL can vary from sample to sample depending on sample size, matrix interferences, moisture content, and other sample-specific conditions. In general, PQLs used by STL will reflect the lowest concentrations of an analyte that can be accurately and reproducibly detected by the analytical method employed.

PQLs for nitroaromatics and nitroamines in groundwater samples will generally range from approximately 0.4 to 0.5 ug/L including 2,4- and 2,6-DNT.

B.2 Data Quality Objectives and Indicators

The data quality objective for this project is to determine concentrations of contaminants in soils and groundwater to verify compliance with cleanup requirements and to characterize soil for disposal. Data quality indicators (DQIs), including precision, accuracy, representativeness, comparability, and completeness (PARCC parameters), and data reporting limits are dictated by the project requirements and DQOs. An assessment of data quality is based upon quantitative (precision, accuracy, and completeness) and

qualitative (representativeness and comparability) indicators. Definitions of these parameters and the applicable quality control procedures are given below.

Precision. Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average values. Analytical precision is measured through matrix spike/matrix spike duplicate (MS/MSD) samples and laboratory control samples/laboratory control sample duplicate (LCS/LCSD) for organic analysis. Analytical precision is quantitatively expressed as the relative percent difference (RPD) between the LCS/LCSD, MS/MSD, or duplicates. Analytical precision measurements will be carried out at a minimum frequency of one per laboratory analysis group. Laboratory precision will be evaluated against laboratory quantitative RPD performance criteria.

Accuracy. Accuracy measures the closeness of the measured value to the true value. The accuracy of chemical test results is assessed by "spiking" samples with known standards (surrogates blank spikes, or matrix spikes) and establishing the average recovery. Accuracy measurements on matrix spike samples will be carried out at a minimum frequency of one in 20 samples per matrix analyzed. Because MS/MSDs measure the matrix interferences of a specific matrix, the laboratory will perform MS/MSDs only on samples from this investigation and not from other projects. Blank spikes will also be carried out at a minimum frequency of one in 20 samples per matrix analyzed. Surrogate recoveries will be determined for every sample analyzed for organics. Laboratory accuracy will be evaluated against quantitative matrix spike and surrogate spike recovery performance criteria as presented in Table B-1 located at the end of the main text.

Representativeness. Representativeness measures how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the matrix sampled. The sampling plan design, sampling techniques, and sample handling protocols (e.g., storage, preservation, and transportation) have been developed to assure representative samples.

Comparability. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard techniques for both sample collection and laboratory analysis should make data collected comparable to both internal and other data generated.

Completeness. Completeness is defined as the percentage of measurements made which are judged to be valid measurements. Results will be considered valid if all the precision, accuracy, and representativeness objectives are met and if reporting limits are sufficient for the intended uses of the data. The target completeness goal for this project is 95 percent.

Laboratory internal quality control checks, preventative maintenance, and corrective action, as described in other sections of this document, will be implemented to help meet the quality assurance objectives established for these analyses.

B.3 Quality Control Procedures

Laboratory Quality Control. The laboratory's quality control officers are responsible for assuring that the laboratory implements all routine internal quality assurance and quality control procedures. The laboratory quality control procedures used for this project will consist of the following at a minimum:

- Instrument calibration and standards as defined in the laboratory SOPs;
- Laboratory blank measurements at a minimum frequency of 5 percent or one per 20 samples; and
- Accuracy and precision measurements as defined above, at a minimum frequency of 5 percent or one per 20 samples per matrix.

B.4 Corrective Actions

If routine QC audits by the laboratory result in detection of unacceptable conditions or data, actions specified in the laboratory SOPs will be taken. Specific corrective actions are outlined in each SOP used and include but are not limited to the following:

- Identifying the source of the violation;
- Reanalyzing samples if holding time criteria permit;
- Resampling and analyzing;
- Evaluating and amending sampling and analytical procedures; and/or
- Accepting data and flagging to indicate the level of uncertainty.

If unacceptable conditions occur, the laboratory will contact Aspect Consulting to discuss the issues and determine the appropriate corrective action. All corrective actions taken by the laboratory during analysis of samples for this project will be documented by the laboratory in the case narrative associated with the impacted samples.

B.5 Data Reduction, Quality Review, and Reporting

Data will undergo two levels of QA/QC evaluation: one at the laboratory; and one by Aspect Consulting. Initial data reduction, evaluation, and reporting at the laboratory will be carried out as described in the appropriate analytical protocols. Quality control data resulting from methods and procedures described in this document will also be reported.

B.5.1 Minimum Data Reporting Requirements

The following describes the minimum data reporting requirements necessary to ensure sufficient reporting of analytical data to allow proper QA/QC reporting.

Sample Receipt. Cooler receipt forms will be supplied to the laboratories to be filled out for all sample shipments to document problems in sample packaging, chain of custody, and sample preservation.

Reporting. For each analytical method run, analytes for each sample will be reported as a detected concentration or as less than the specific reporting limit. Solid samples will be

reported on a dry weight basis. The laboratories will also report dilution factors for each sample as well as date of extraction (if applicable), date of analysis, extraction method, any cleanup methods performed, and confirmation results where required.

Internal Quality Control Reporting. Internal quality control samples will be analyzed at the rates specified in the applicable analytical method.

- Laboratory Blanks. Analytes will be reported for each laboratory blank. Non-blank sample results shall be designated as corresponding to a particular laboratory blank in terms of analytical batch processing.
- Surrogate Spike Samples. Surrogate spike recoveries will be reported with all organic reports where appropriate. The report shall also specify the control limits for surrogate spike results as well as the spiking concentration. Out of control recoveries (as defined in the Method Compendium) will be reported immediately to the Project QA Officer. Out of control recoveries (as defined in the method) will result in the sample being rerun (both sets of data are to be reported).
- Matrix Spike Samples. Matrix spike recoveries will be reported for organic and inorganic analyses. General sample results will be designated as corresponding to a particular matrix spike sample. The report will indicate which sample was spiked and the spike concentration. The report will also specify the control limits for matrix spike results for each method and matrix.
- Laboratory Duplicates and/or Matrix Spike Duplicate Pairs. Relative percent differences will be reported for duplicate pairs as well as analyte/matrix-specific control limits.
- Laboratory Control Samples (LCS). LCS recoveries will be reported for organic analyses. LCS results and control limits will be reported with the corresponding sample data.

B.5.2 Quality Review

Reported analytical results will be qualified by the laboratory to identify quality control concerns in accordance with the specifications of the analytical methods. Additional laboratory data qualifiers may be defined and reported by the laboratory to more completely explain quality control concerns regarding a particular sample result. Additional data qualifiers will be defined in the laboratory's narrative reports associated with each case.

Aspect Consulting will be responsible for data quality review. A data quality review summary will be produced for this project and included in the final construction report. Aspect Consulting will perform the review in accordance with EPA National Functional Guidelines (EPA 1994) with regard to the following, as appropriate to the particular analysis:

- Sample Documentation/Custody;
- Holding Times;
- Method Blanks (Representativeness);
- Reporting Limits;

- Laboratory Duplicate Relative Percent Differences (Precision);
- Blank Spike, Matrix Spike, and Surrogate Percent Recoveries (Accuracy);
- Comparability;
- Completeness; and
- Data Report Formats.

B.6 Preventative Maintenance Procedures and Schedules

Preventive maintenance in the laboratory will be the responsibility of the laboratory personnel and analysts. This maintenance includes routine care and cleaning of instruments, and inspection and monitoring of carrier gases, solvents, and glassware used in analyses. Details of the maintenance procedures are addressed in the respective laboratory's SOPs.

Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to change as indicated by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the method-specific quality control criteria.

B.7 Performance and System Audits

Aspect Consulting's Analytical QA Manager will monitor the performance of the laboratory QA program. This will be achieved through regular contact with the analytical QA staff.

To ensure comparable data, samples of a given matrix to be analyzed by each specified analytical method will be processed consistently by the same analytical laboratory.

B.8 QC Reports to Management

A quality assurance summary report will be included in the final report. The summary will include the evaluation of the data in accordance with data quality objectives, and will include discussions on precision, accuracy, representativeness, completeness, comparability, and reporting limits.

B.9 Reference for Appendix B

EPA 1994. USEPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review, February 1994.

APPENDIX C

Health and Safety Plan
Drum Burial Area
Maytown, Washington

Emergency Contingency Information

SITE LOCATION	Drum Burial Area Former Pacific Powder Site 13120 Tilly Road South Olympia, Washington
NEAREST HOSPITAL	Providence St. Peter Hospital 413 Lilly Road, NE Olympia, Washington (360) 491-9480 The route from the facility to the hospital is depicted on Figure C-1.
EMERGENCY RESPONDERS	Police Department..... 911 Fire Department ..... 911 Ambulance 911
EMERGENCY CONTACTS	Aspect Consulting, Seattle Office ..... (206) 328-7443 Jay Allen, Allen and Co., LLC..... (425) 888-7230 Wenqin Wang, Citifor..... (206) 622-3770
IN EVENT OF EMERGENCY, CALL FOR HELP AS SOON AS POSSIBLE	Give the following information: ➔ **Where You Are**. Address, cross streets, or landmarks ☎ **Phone Number** you are calling from ?? **What Happened**. Type of injury, accident # **How many persons** need help ?? **What is being done** for the victim(s) !! **You hang up last.** Let whomever you called hang up first

Figure C-1

Emergency Route to Hospital Map

Site Health and Safety Plan Summary

SITE NAME: Drum Burial Area - Former Pacific Powder Site.

LOCATION: 13120 Tilly Road South, Olympia, Washington.

CLIENT: Citifor Inc.

PROPOSED DATES OF ACTIVITIES: February 2005 – December 2005.

TYPE OF FACILITY: Former explosives manufacturing site.

LAND USE OF AREA SURROUNDING FACILITY: Rural Residential and Rural Resource Industrial.

SITE ACTIVITIES:

- Excavation and disposal of DNT-impacted soils; and
- Collection of surface and subsurface soil samples and groundwater samples.

POTENTIAL SITE CONTAMINANTS: 2,4-dinitrotoluene and 2,6-dinitrotoluene (2,4- and 2,6-DNT).

ROUTES OF ENTRY: Inhalation of dust; skin contact with soil or groundwater; and incidental ingestion of soil or groundwater.

PROTECTIVE MEASURES: Engineering controls, safety glasses, safety boots, hardhat, gloves, protective clothing, and respirators. Excavators will be equipped with a blast shield and all workers will operate with the expectation of encountering explosive hazards.

MONITORING EQUIPMENT: Visual evidence of dust generation.

C.1 Introduction

C.1.1 Purpose and Regulatory Compliance

This site-specific Health and Safety Plan (HSP) addresses procedures to minimize the risk of chemical exposures, physical accidents to on-site workers, and environmental contamination. The HSP covers each of the 11 required plan elements as specified in 29 CFR 1910.120 or equivalent state regulations. Table C-1 lists the sections of this plan, which apply to each of these required elements. When used together with the Aspect Consulting Corporate HSP, this site-specific plan meets all applicable regulatory requirements.

Table C-1. Location of Required Health and Safety Plan Elements in this Site-Specific HSP

Required HSP Element	Section in this Health and Safety Plan
Confined space entry	C.2.6 Other Physical Hazards
Decontamination	C.7 Decontamination
Emergency response plan	C.11 Emergency Response
Medical surveillance	C.12 Medical Surveillance
Monitoring program	C.2.3 Air Monitoring and Action Levels
Names of key personnel	C.1.3 Chain of Command
Personal protective equipment	C.3 Protective Equipment, C.4 Safety Equipment List
Safety and hazard analysis	C.2 Hazard Evaluation and Control Measures
Site control	C.5 Exclusion Areas, C.9 Site Security and Control
Spill containment	C.10 Spill Containment
Training	C.13 Training Requirements

C.1.2 Distribution and Approval

This HSP will be made available to all Aspect Consulting personnel involved in field work on this project. It will also be made available to subcontractors and other non-employees who may need to work on the site. For non-employees, it must be made clear that the plan represents minimum safety procedures and that they are responsible for their own safety while present on site. The plan has been approved by the Aspect Consulting Corporate Health and Safety (H&S) Manager. By signing the documentation form provided with this plan (located at the end of plan), project workers also certify their approval and agreement to comply with the plan.

C.1.3 Chain of Command

The chain of command for health and safety on this project involves the following individuals:

Project Manager/Corporate H&S Officer: Steve Germiat

The Project Manager has overall responsibility for the successful outcome of the project. In this case, the Project Manager is also Aspect Consulting's Corporate Health and Safety Officer. The Project Manager makes final decisions regarding questions concerning the implementation of the site-specific HSP. The Project Manager may delegate this authority and responsibility to the Project or Field H&S Managers.

Project H&S Manager: Mike Ehlebracht

The Project H&S Manager has overall responsibility for health and safety on this project. This individual ensures that everyone working on this project understands this HSP. This individual will maintain liaison with the project team so that all relevant health and safety issues are communicated effectively to project workers.

Field H&S Manager: Bob Hanford

The Field H&S Manager is responsible for implementing this HSP in the field. This individual also observes subcontractors to verify that they are following these procedures, at a minimum. The Field H&S Manager will also assure that proper protective

equipment is available and used in the correct manner, decontamination activities are carried out properly, and that employees have knowledge of the local emergency medical system should it be necessary.

C.1.4 Site Work Activities

The following work tasks will be accomplished:

- Exploratory trenching to evaluate presence of debris away from the existing excavation areas;
- Excavation and disposal of DNT-contaminated soils; and
- The collection of surface and subsurface soil samples and groundwater samples.

The expected time frame of this project is September 2003 through December 2004.

C.1.5 Site Description

The site is a former explosives manufacturing facility.

C.2 Hazard Evaluation and Control Measures

C.2.1 Toxicity of Chemicals of Concern

Based on previous site information and knowledge of the types of activities conducted at this location, the following chemicals may be present at this site: 2,4- and 2,6-DNT.

Health hazards of these chemicals are discussed below. This information covers potential toxic effects, which might occur if relatively significant acute and/or chronic exposure were to happen. This information does not mean that such effects will occur from the planned site activities. In general, the chemicals, which may be encountered at this site, are not expected to be present at concentrations that could produce significant exposures. The types of planned work activities and use of monitoring procedures and protective measures will limit potential exposures at this site.

These standards are presented using the following abbreviations:

PEL	Permissible exposure limit.
TWA	Time-weighted average exposure limit for any 8-hour work shift.
STEL	Short-term exposure limit expressed as a 15-minute time-weighted average and not to be exceeded at any time during a workday.

2,4-Dinitrotoluene (2,4-DNT)

2,4-Dinitrotoluene (2,4-DNT) is a nitroaromatic compound present as an impurity in TNT and as the main component of military grade DNT. The latter compound is used as a military propellant and ordnance material. Exposure to 2,4-DNT may be expected to occur via the skin or through accidental ingestion or inhalation of contaminated soils or other debris. Toxic effects of overexposure include the induction of methemoglobin formation, which reduces the oxygen carrying capacity of the blood. Animal studies have also reported toxic effects to the liver, kidney, and nervous systems. The EPA classifies 2,4-DNT as a Class B2, or probable, human carcinogen. The current PEL-TWA for dinitrotoluene is 1.5 mg/m^3.

Two studies currently document the potentially carcinogenic effects of 2,4-DNT in rats and mice. One study (NCI 1978) reports benign tumors in rats, with no evidence of treatment-related carcinomas seen in either mice or rats. Ellis et al. (1979) reported a significant increase over controls in the incidence of hepatocellular carcinomas and hepatic neoplastic nodules in rats following administration of technical grade 2,4-DNT (t-2,4-DNT) in the diet for two years. In general, it appears that t-2,4-DNT is a potential carcinogen in mammalian systems, although metabolic activation may be required. Technical grade 2,4-DNT, however, contains 2,6-DNT as an impurity. The potency attributable to 2,4-DNT may be in part attributable to 2,6-DNT, a potent hepatocarcinogen (Etnier 1987).

EPA (1986) and EPA (1991) have classified 2,4-DNT as a probable human carcinogen (Group B2) and have assigned an oral potency slope of 0.68 $(mg/kg\text{-}day)^{-1}$ (EPA 1991). However, Etnier (1987) has argued that most of the carcinogenicity attributed to 2,4-DNT is in fact due to 2,6-DNT, that carcinogenesis associated with 2,4-DNT has been inadequately quantified, and that pure 2,4-DNT does not appear to be carcinogenic. Based on these data, 2,4-DNT may be more appropriately designated as Group D (non-classified), with an upperbound potency slope of 0.19 $(mg/kg\text{-}day)^{-1}$.

The form of 2,4-DNT likely to be present in the Drum Burial Area is expected to resemble technical 2,4-DNT with 2,6-DNT isomer impurities. Accordingly, for the purposes of the present plan the more conservative potency slope of 0.683 $(mg/kg\text{-}day)^{-1}$ was used for this isomer. This value has been accepted by EPA and is reported for inclusion in the IRIS.

2,4-DNT is efficiently absorbed from the mammalian gastrointestinal tract. Etnier (1987) and ATSDR (1989) reports 80 to 90 percent absorption of 2,4-DNT within 24 hours following oral administration to rats, although it is not known whether this compound is more efficiently absorbed from food than from drinking water. Etnier (1987) also reports efficient absorption following inhalation of 2,4-DNT.

2,6-Dinitrotoluene (2,6-DNT)

2,6-Dinitrotoluene (2,6-DNT) is a nitroaromatic ordnance compound present as a minor constituent in military grade TNT and DNT. Exposure to 2,6-DNT may be expected to occur via the skin or through accidental ingestion or inhalation of contaminated soils or other debris. Toxic effects of overexposure include the induction of methemoglobin formation, which reduces the oxygen carrying capacity of the blood. Other animal studies have also reported toxic effects to the liver, kidney, and nervous systems. The EPA classifies 2,6-DNT as a Class B2, or probable, human carcinogen. The current PEL-TWA for dinitrotoluene is 1.5 mg/m^3.

EPA (1991a) classifies 2,6-DNT as a probable human carcinogen (Group B2) along with 2,4-DNT, and have assigned an equivalent oral potency value of 0.68 $(mg/kg\text{-}day)^{-1}$. Etnier (1987), however, argues that 2,6-DNT is unquestionably a more potent hepatocarcinogen and estimates an oral carcinogenic potency slope factor of 4.83 $(mg/kg\text{-}day)^{-1}$. While more conservative, this value is supported by available data on the carcinogenicity of this compound to laboratory animals. Ellis et al. (1979) found significant elevations in renal and hepatic tumors in a study with technical grade 2,4-DNT (i.e., a mixture of both 2,4- and 2,6-DNT isomers).

For the purposes of this assessment, the verified potency slope derived by EPA (1991) for 2,6-DNT was utilized for risk calculations. No inhalation guidelines have been identified for 2,6-DNT, and it was assumed that inhalation exposures would be adequately addressed via the oral slope factor. Therefore the interim oral carcinogenic potency slope factor (see above) was used to address inhalation exposures as well for the purposes of this plan. 2,6-DNT is efficiently absorbed from the mammalian gastrointestinal tract. Etnier (1987) reports 60 percent absorption of 2,6-DNT within 24 hours following oral administration to rats. It is not known whether this compound is more efficiently absorbed from food than from drinking water. Etnier (1987) also reports efficient absorption following inhalation of 2,6-DNT.

C.2.2 Potential Exposure Routes

Inhalation

Exposure via this route could occur through inhalation of dusts contaminated with site chemicals. Visual air monitoring for dust and control measures specified in this plan will minimize the possibility for inhalation of site contaminants.

Skin Contact

Exposure via this route could occur if contaminated soil or water contacts the skin or clothing. Dusts generated during soil movement may also settle on exposed skin and clothing of site workers. Protective clothing and decontamination activities specified in this plan will minimize the potential for skin contact with the contaminants.

Ingestion

Exposure via this route could occur if individuals eat, drink or perform other hand-to-mouth contact in the contaminated (exclusion) zones. Decontamination procedures established in this plan will minimize the inadvertent ingestion of contaminants.

C.2.3 Air Monitoring

Air monitoring for dust will primarily be based on visual observations. If persistent dusty conditions are observed by the field representative, engineering controls (e.g. wetting of surface soils) or personnel protective equipment (e.g., air-purifying respirator with high efficiency particular abatement [HEPA] cartridge) will be used to minimize inhalation exposures.

C.2.4 Fire and Explosion Hazard

No fire hazards are expected on site. Although 2,4-DNT and 2,6-DNT are explosive compounds, they are not shock sensitive and not believed to be present in concentrations in soil on site to constitute an explosion hazard. Although DNT is not an explosive hazard, excavation work as part of this interim action will be conducted with special care as outlined in Section C.2.6. For general safety, an ABC dry chemical fire extinguisher with a minimum charge of 10 pounds shall be a part of the sampling equipment brought to the site.

C.2.5 Heat and Cold Stress

Use of impermeable clothing reduces the cooling ability of the body due to evaporation reduction. This may lead to heat stress. Cold stress, or hypothermia, can result from abnormal cooling of the core body temperature.

Signs of Heat Stress

"Heat stress" is a term that is used to describe progressively more serious symptoms, as follows:

- An initial rise in skin temperature due to increased blood flow to the skin (skin redness);
- Increase in heart rate, to more than 30 beats/minute above the resting level;
- Collapse, or heat exhaustion, due to inadequate blood flow to the brain;
- Dehydration, due to excessive sweating;
- Hyperventilation, resulting in a reduction of the normal blood carbon dioxide concentrations;
- Tingling around the lips, dizziness, cramping of muscles of hands and feet, and blackout; and finally
- "Heat stroke," characterized by unconsciousness, hot dry skin, and absence of sweating.

Control of Heat Stress

On hot, sunny days (high radiant heat load), if using impermeable work clothing, maintain appropriate work-rest cycles (progressively longer rest breaks in a cool location or the shade as temperature and work tasks increase) and drink water or electrolyte-rich fluids (Gatorade or equivalent) to minimize heat stress effects. Impermeable clothing will only be worn when absolutely necessary for control of hazardous chemicals.

Also, when ambient temperatures exceed 70 degrees F, employees will conduct monitoring of their heart (pulse) rates, as follows:

- Each employee will check his or her own pulse rate at the beginning of each break period;
- Take the pulse at the wrist for 6 seconds, and multiply by 10; and
- If the pulse rate exceeds 110 beats per minute, then reduce the length of the next work period by one-third.

Example: After a one-hour work period at 80 degrees, a worker has a pulse rate of 120 beats per minute. The worker must therefore shorten the next work period by one-third, resulting in a work period of 40 minutes until the next break.

Treatment of Heat Stress

Individuals affected by mild forms of heat stress (heat exhaustion, dehydration, or cramping) should take a break in a cool or shaded location, drink liquids, and sit or lay down until feeling better. Shorter work periods should be used until temperature cools off.

Individuals affected by heat stroke are in critical condition. Summon emergency aid immediately, remove clothing, and bathe individual in cool water continually to bring down body temperature.

Signs of Hypothermia

Hypothermia can result from abnormal cooling of the core body temperature. It is caused by exposure to a cold environment, and wind-chill as well as wetness or water immersion can play a significant role. The following discusses signs and symptoms as well as treatment for hypothermia.

Typical warning signs of hypothermia include fatigue, weakness, incoordination, apathy, and drowsiness. A confused state is a key symptom of hypothermia. Shivering and pallor are usually absent, and the face may appear puffy and pink. Body temperatures below 90? F require immediate treatment to restore temperature to normal.

Treatment of Hypothermia

Current medical practice recommends slow rewarming as treatment for hypothermia, followed by professional medical care. This can be accomplished by moving the person into a sheltered area and wrapping with blankets in a warm room. In emergency situations where body temperature falls below 90? F and heated shelter is not available, use a sleeping bag, blankets, and/or body heat from another individual to help restore normal body temperature.

C.2.6 Other Physical Hazards

Possible Explosive Hazard during Excavation

Although excavation previously completed in the Drum Burial Area has not encountered energetics and explosives (E&E) that pose an explosive hazard, all excavation work completed as part of this interim remedial action will be conducted with the expectation of encountering E&E. The excavator completing both exploratory trenching and soil removal will be equipped with a polycarbonate blast shield no less than 1-inch thick. Field personnel overseeing excavation should remain away from the excavation/trench while the shielded excavator is digging and approach the excavation/trench only after it is dug. Beyond personal protective equipment required by this Plan, field personnel overseeing excavation should also wear Nomex™ fire-retardant coveralls, and use stainless steel (non-sparking) equipment for soil sampling.

Trips/Falls

As with all field work sites, caution will be exercised to prevent slips on rain slick surfaces, stepping on sharp objects, etc. Work will not be performed on elevated platforms without fall protection. All excavations will be temporarily enclosed during work with barrier tape, or similar measures will be used to prevent workers from accidentally falling into an excavation.

Confined Spaces

Confined space entry is not anticipated for this project. Personnel will not enter any confined space, such as excavations, tanks, or trenches, without specific approval of the Project Manager and Corporate H&S Manager. In addition, no entry into a confined space will be attempted until the atmosphere of the confined space is properly tested and documented by the Field H&S Manager or designated representative and a self-contained breathing apparatus is available on site. A confined space entry permit must also be issued and followed. All specified precautions must be carefully followed, including upgrading of personal protective equipment as directed by the Field H&S Manager or designated representative.

Noise

Appropriate hearing protection (ear muffs or ear plugs with a noise reduction rating of at least 25 dB) will be used for individuals working near an active drill rig or other high-noise generating equipment.

C.2.7 Hazard Analysis and Applicable Safety Procedures by Task

The work tasks and associated hazards, which may be anticipated during the operations described elsewhere in this work plan, and suitable control measures are presented in Table C-2.

Table C-2 - Hazard Analysis by Task

Work Task	Hazards	Protective Measures[a,b]
Site reconnaissance	None anticipated	Level D PPE
Trenching or Excavation	Skin contact, moving equipment, inhalation, fire/explosion risk	Level D or C PPE with Nomex fire retardant coveralls, caution around moving equipment, staying back from excavations being dug by excavator equipped with blast shield, visual dust monitoring with engineering controls
Sample collection	Splashes, skin contact, inhalation	Level D or C PPE

[a]Level C is typically modified to include respiratory protection only as warranted by contaminants.
[b]Protection levels may require upgrade based on site monitoring or other information.

In addition, special task requirements include the following.

Excavation Activities

Excavation activities will be conducted with appropriate safety procedures as discussed under **Possible Explosive Hazard During Excavation** above. Exclusion zones will be established for worker protection. Employees will be cautioned to stand clear of all equipment and open excavations. Employees will not enter any excavations of 4 feet or greater depth without proper shoring or sloping.

Soil, Surface Water, and Groundwater Sampling

All soil, surface water, and groundwater sampling activities will be conducted under the assumption that the media is contaminated and appropriate personal protective equipment will be required.

C.3 Personal Protective Equipment (PPE)

Minimum personal protective equipment (PPE) requirements are based on the potential route of contact and the potential contaminants. These requirements are classified in the designated Level D and C categories as discussed below. In this plan, Level C is

presented as a modified protection level, incorporating respiratory protection only where required by site conditions or as specified under the previous discussion of drums. Situations requiring Level A or B protection are not anticipated for this project. As noted previously, should they occur, work will stop and the HSP will be amended as required prior to resuming work.

C.3.1 Level D Activities

Workers performing general site activities where skin contact with contaminated materials is not likely and inhalation risks are not expected will wear regular work clothes, rain gear, or Tyvek®, eye protection, hard hat, nitrile or neoprene-coated work gloves, and safety boots. Field personnel overseeing excavation should also wear Nomex™ fire-retardant coveralls, and use stainless steel (non-sparking) equipment for soil sampling.

C.3.2 Level C Activities

Workers performing site activities where skin contact with contaminated materials is possible will wear chemical-resistant gloves (nitrile, neoprene, or other appropriate outer gloves, surgical inner gloves) and Tyvek® or rain gear. Make sure the protective clothing and gloves are suitable for the types of chemicals which may be encountered on site. Field personnel overseeing excavation should also wear Nomex™ fire-retardant coveralls, and use stainless steel (non-sparking) equipment for soil sampling.

When performing activities in which inhalation of dusts is a concern, wear half-mask or full-face air-purifying respirators with HEPA cartridge. If respirators are used, cartridges should be changed on a daily basis, at minimum.

C.4 Safety Equipment List

The following Safety Equipment must be available on site:

- Fire Extinguisher - 10 lb ABC;
- First Aid Kit;
- Eye Wash Kit;
- Mobile Telephone;
- Half-face APR with HEPA Cartridge;
- Hard Hat;
- Tyvek® Coveralls or rainsuit;
- Nomex™ fire retardant coveralls (workers doing excavation work);
- Neoprene Steel-Toed Boots; and
- Nitrile Outer Gloves.

C.5 Exclusion Areas

If migration of chemicals from the work area is a possibility, or as otherwise required by regulations or client specifications, site control will be maintained by establishing clearly

identified work zones. These will include the exclusion zone, contaminant reduction zone, and support zone, as discussed below.

C.5.1 Exclusion Zone

Exclusion zones will be established around each hazardous waste activity location. Only persons with appropriate training and authorization from the Field H&S Manager will enter this perimeter while work is being conducted there. Traffic cones, barrier tapes, and warning signs will be used as necessary to establish the zone boundary.

C.5.2 Contamination Reduction Zone

A contamination reduction zone will be established just outside each temporary exclusion zone to decontaminate equipment and personnel as discussed below. This zone will be delineated from the exclusion zone and support zone using the means noted above. Care will be taken to prevent the spread of contamination from this area. Drums will be filled with spent decontamination fluids and used protective clothing on a daily basis. The drums, after labeling, will be moved to central storage location(s) on site pending disposal.

C.5.3 Support Zone

A support zone will be established outside the contamination reduction area to stage clean equipment, don protective clothing, take rest breaks, etc. This zone will be clearly delineated from the contaminant reduction zone using the means noted above.

C.6 Minimization of Contamination

To ensure the work zone procedures function effectively, the amount of equipment and number of personnel allowed in contaminated areas must be minimized. In addition, the amounts of soil, water, or other media collected should not exceed what is needed for laboratory analysis and record samples. Do not kneel on contaminated ground, stir up unnecessary dust, or perform any practice that increases the probability of hand-to-mouth transfer of contaminated materials. Use plastic drop cloths and equipment covers where appropriate. Eating, drinking, chewing gum, smoking, or using smokeless tobacco is forbidden in the exclusion zone.

C.7 Decontamination

Decontamination is necessary to limit the migration of contaminants from the work zone(s) onto the site or from the site into the surrounding environment. Equipment and personnel decontamination are discussed in the following sections, and the following types of equipment will be available to perform these activities:

- Boot and Glove Wash Bucket and Rinse Bucket;
- Scrub Brushes - Long Handled;
- Spray Rinse Applicator;
- Plastic Garbage Bags; and
- 5-Gallon Container Alkaline Decon Solution.

C.7.1 Equipment Decontamination

Proper decontamination (decon) procedures will be employed to ensure that contaminated materials do not contact individuals and are not spread from the site. These procedures will also ensure that contaminated materials generated during site operations and during decontamination are managed appropriately.

All non-disposable equipment will be decontaminated in the contamination reduction zone. Prior to demobilization, all contaminated portions of heavy equipment should be thoroughly cleaned. Heavy equipment may require steam cleaning. Soil and water sampling instruments should be cleaned with detergent solutions in portable buckets.

C.7.2 Personnel Decontamination

Personnel working in exclusion zones will perform a mini-decontamination in the contamination reduction zone prior to changing respirator cartridges (if worn), taking rest breaks, drinking liquids, etc. They will decontaminate fully before eating lunch or leaving the site. The following describes the procedures for mini-decon and full decon activities.

Mini-decon Procedure

1. In the contamination reduction zone, wash and rinse outer gloves and boots in portable buckets.
2. Inspect protective outer suit, if worn, for severe contamination, rips or tears.
3. If suit is highly contaminated or damaged, full decontamination as outlined below will be performed.
4. Remove outer gloves. Inspect and discard if ripped or damaged.
5. Remove respirator (if worn) and clean off sweat and dirt using premoistened towelettes. Deposit used cartridges in plastic bag.
6. Replace cartridges and outer gloves, and return to work.

Full Decontamination Procedure

1. In the contamination reduction zone, wash and rinse outer gloves and boots in portable buckets.
2. Remove outer gloves and protective suit and deposit in labeled container for disposable clothing.
3. Remove respirator, and place used respirator cartridges (if end of day) in container for disposable clothing.
4. If end of day, thoroughly clean respirator and store properly.
5. Remove inner gloves and discard into labeled container for disposable clothing.
6. Remove work boots without touching exposed surfaces, and put on street shoes. Put boots in individual plastic bag for later reuse.
7. Immediately wash hands and face using clean water and soap.
8. Shower as soon after work shift as possible.

C.8 Disposal of Contaminated Materials

All disposable sampling equipment and materials will be placed inside of polyethylene bags or other appropriate containers and placed in storage as directed by the client. If storage is unavailable on site, or if other hazardous wastes will not be gathered and collected as part of this effort, then disposable supplies will be removed from the site with the personnel.

C.9 Site Security and Control

Site security and control will be the responsibility of the Project Manager. The "buddy-system" will be used when working in designated hazardous areas. Any security or control problems will be reported to appropriate authorities.

C.10 Spill Containment

Sources of bulk chemicals subject to spillage are not expected to be encountered in this project. Accordingly, a spill containment plan is not required for this project.

C.11 Emergency Response

Field personnel shall always exercise caution and look for signs of potentially hazardous situations, including the following as examples:

- Visible or odorous chemical contaminants;
- Drums or other containers;
- General physical hazards (traffic, moving equipment, sharp or hot surfaces, slippery or uneven surfaces, etc.);
- Residual energetics/explosives materials;
- Live electrical wires or equipment;
- Underground pipelines or cables; and
- Poisonous plants or dangerous animals.

These and other potential problems should be anticipated and steps taken to avert problems before they occur.

The Field H&S Manager shall act as the lead individual in the event of an emergency situation and evaluate the situation. He/she will determine the need to implement the emergency procedures, in concert with other resource personnel including client representatives, the Project Manager, and the Corporate H&S Manager. Other on-site field personnel will assist the Field H&S Manager as required during the emergency. In the event of an emergency, the Field H&S Manager or designee is responsible for alerting all personnel at the affected area by use of a signal device (such as a vehicle horn) or visual or shouted instructions, as appropriate.

- Emergency Telephone Numbers: see list at the beginning of this plan;
- Route to Nearest Hospital: see list and route map on Figure C-1 at the beginning of this plan; and

- If a significant environmental release of contaminants occurs, the federal, state, and local agencies noted in this plan must be notified.

In the event of an emergency situation requiring implementation of the Emergency Response Plan (fire or explosion, serious injury, tank leak or other material spill, presence of chemicals above exposure guidelines, inadequate personal protective equipment for the hazards present, etc.), cease all work immediately. Offer whatever assistance is required, but do not enter work areas without proper protective equipment. Workers not needed for immediate assistance will decontaminate per normal procedures (if possible) and leave the work area, pending approval by the Field H&S Manager for restart of work.

If a worker leaves the site to seek medical attention, another worker should accompany the patient. When in doubt about the severity of an accident or exposure, always seek medical attention as a conservative approach.

C.12 Medical Surveillance

A medical surveillance program has been instituted for Aspect Consulting employees having exposure to hazardous substances above permissible exposure levels for 30 or more days per year.

C.13 Training Requirements

Aspect Consulting employees who perform site work will have completed 40 hours of off-site initial hazardous materials health and safety training or will possess equivalent training by past experience. They will also have a minimum of three days of actual field experience under the direct supervision of a trained supervisor. Employees will also complete annual refresher, supervisor, and other training as required by applicable regulations.

C.14 Documentation

Aspect Consulting staff and subcontractors on this site will sign the attached Record of Health and Safety Communication, which documents that they have read and understood this health and safety plan. This record will be kept on site during work activities and retained in the project files.

Record of Health and Safety Communication

PROJECT NAME: Drum Burial Area Interim Remedial Action Former Pacific Powder Site	**PROJECT NUMBER:**

SITE CONTAMINANTS: 2,4- dinitrotoluene and 2,6--dinitrotoluene (2,4- and 2,6-DNT)

PPE REQUIREMENTS (check all that apply):

_X_ Safety glasses	**_X_ Gloves (specify)**	Nitrile
_X_ Safety boots	**_X_ Clothing (specify)**	Tyvek or rain gear
_X_ Hard hat	**_X_ Respirator (specify)**	Half-face with HEPA Cartridge
	_X_ Other (specify)	Nomex coveralls for excavation work

The following personnel have reviewed a copy of the Site-specific Health and Safety Plan. By signing below, these personnel indicate that they have read the plan, including all referenced information, and that they understand the requirements which are detailed for this project.

PRINTED NAME	SIGNATURE	DATE